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Copper is an essential element that must be present in the diet for normal metabolic function of the pig. Research has also shown that when copper is included in the diet at high levels (125 to 250 ppm) a response in performance of growing pigs is noted. Chelated substances are more soluble and because of this it is assumed they may be absorbed and utilized at a higher rate than normal compounds.

The objectives of this experiment were to determine the effect of chelated copper on rate and efficiency of growing pigs and to evaluate different levels of chelated copper as a growth promotant.

Experimental Procedure

One hundred thirty-two crossbred pigs averaging approximately 69 lb. were allotted on the basis of weight, ancestry and sex to three replicates of six treatments. Replicates 1 and 2 contained 48 pigs and replicate 3 had 36 pigs. There were 4 barrows and 4 gilts in each lot in the first two replicates and 3 barrows and 3 gilts in each lot in replicate 3. The pigs were housed in an enclosed, slatted floor confinement building. The experiment was conducted for 10 weeks.

The composition of the basal diet is shown in table 1. The experimental treatments were as follows:

1. Basal diet
2. Basal diet + 12.5 ppm chelated copper
3. Basal diet + 25 ppm chelated copper
4. Basal diet + 50 ppm chelated copper
5. Basal diet + 200 ppm chelated copper
6. Basal diet + 200 ppm copper sulfate

Results

Growth and feed data for this experiment are summarized in table 2. The most rapid gains were made by pigs fed the highest levels of copper, either as chelated or nonchelated copper sulfate. The pigs fed these diets gained 1.83 and 1.85 lb. per day, chelated and nonchelated, respectively, which was approximately 0.1 lb. per day faster than pigs fed the lower levels of chelated copper and slightly faster than the 1.77 lb. per day gain of pigs fed the basal diet. However, none of the differences noted here were statistically significant.

There were no significant differences in feed consumption or feed/gain. The highest daily feed consumption was by pigs fed the basal diet. Feed/gain was highest for pigs fed 12.5 ppm of chelated copper (3.33) and lowest for pigs fed 200 ppm of nonchelated copper (3.14). Previous work at this station has shown that levels of 200 to 250 ppm of copper are more consistently beneficial than lower dietary levels. Also, previous research has shown that a greater response is obtained in the young growing pig with a starting weight of approximately 40 lb. and fed copper for about 8 weeks.

There was no benefit of the chelated copper sulfate compared to the non-chelated copper sulfate in this experiment as the low levels of chelated copper did not elicit a response in performance. Pigs fed diets of 200 ppm of copper performed similarly regardless of the form of copper used.

Summary

One hundred thirty-two pigs of an average initial weight of 69 lb. were fed diets of 0, 12.5, 25, 50 and 200 ppm of added copper. There were no significant differences among treatments in rate of gain, daily feed consumption or feed/gain. Pigs fed low levels of chelated copper, 12.5 to 50 ppm, gained about 0.1 lb. per day slower than pigs fed 200 ppm of chelated or non-chelated copper.

Table 1. Composition of Basal Diet

	Percent
Ground corn	79.6
Soybean meal, 44%	18.0
Dicalcium phosphate	1.1
Limestone	0.8
Trace mineral salt	0.4
Premix[a]	0.1

[a]Supplied per lb. of diet: vitamin A, 1500 IU; vitamin D, 150 IU; vitamin E, 2.5 IU; riboflavin, 1.25 mg; pantothenic acid, 5 mg; niacin, 10 mg; choline, 25 mg and vitamin B_{12}, 7.5 micrograms.

Table 2. Effect of Copper on Performance of Growing Pigs

		Chelated copper				Copper sulfate
Copper, ppm	0	12.5	25	50	200	200
Number of pigs[a]	22	20	22	21	21	21
Avg. initial wt., lb.	68.7	69.6	68.9	68.6	69.3	68.7
Avg. final wt., lb.[b]	192.7	188.9	189.7	188.5	190.4	192.3
Avg. daily gain, lb.[b]	1.77	1.70	1.73	1.72	1.83	1.85
Avg. daily feed, lb.	5.76	5.69	5.57	5.51	5.69	5.54
Feed/gain	3.25	3.33	3.23	3.18	3.22	3.14

[a]Three replicates of 8, 8 and 6 pigs per pen initially. Data included only for those pigs that completed the experiment.

[b]Significant difference ($P<.01$) between barrows and gilts.